THE LARVA OF NEVERMANNIA DORCATOMOIDES FISHER WITH COMMENTS ON THE CLASSIFICATION OF THE ANOBIIDAE ACCORDING TO THEIR LARVAE (COLEOPTERA: ANOBIIDAE).

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INTRODUCTORY REMARKS.

The material from which the following description of the mature larva of *Nevermannia dorcatomoides* Fisher is made was collected together with a single imago from the nest of a termite [not determined] by Mr. Ferd. Nevermann, Hamburg Farm, Costa Rica, August 27, 1925. It consisted of three specimens preserved in alcohol and was sent by Mr. Nevermann to Dr. T. E. Snyder, Bureau of Entomology, as a gift. Mr. W. S. Fisher, Bureau of Entomology, examined the imago, found that it represents a new genus and species of Anobiidae and has described and named this genus and species in the preceding article (p. 50).

The larvae have been associated with the imago found together with them in the same termite's nest, for the reason that no other imagines or larvae of Anobiidae were found in the nest, that the larvae represent a new generic type as does the imago, that they are mature, ready to pupate and therefore probably belong to the same generation as the imago, and because they correspond to the imago in size. However, the association of the larvae with the imago has not been definitely proved by rearing.

Of the three given specimens of the larvae, one specimen is kept in alcohol and from this the habitus figure is made; two specimens were dissected and the parts placed in Canada balsam on six permanent slides, now incorporated in the slides collection of the National Museum.

DESCRIPTION OF MATURE LARVA.

(Plate 3.)

(U. S. Nat. Mus., one vial with one specimen marked: "In termite's nest. Hamburg Farm, Costa Rica, Aug. 27, 1925—Nevermann coll. et. ded.—Type specimen.")

General aspect.

The larva (Fig. 7) is about 6 mm. long, subcylindrical, rather elongate and longitudinally curved, with the transversely strongly arched terga much larger than the more flattened pleurae and sternal parts. The head is protracted, almost globular, slightly longer than wide. The thorax is nearly twice as high as the head and a little higher than most of the abdominal segments; the legs have the length and development normal for Anobiid-larvae and are not much larger than the maxillae. Prothorax has no transverse tergal pleads,

mesothorax and metathorax each two tergal pleads representing prescutum and scuto-scutellum with prescutum much longer in the sagital middle line than scuto-scutellum, the first to eighth abdominal segments each a prescutum and a scuto-scutellum but with both of the pleads large and of equal length in the sagittal middle line, those of the seventh and the eighth segments somewhat longer and flatter than the rest; ninth abdominal segment is small, subconical, about as long as one of the prescutal areas of the middle abdominal segments, indistinctly pleaded and laterally on each side provided with a round cushion-like epipleural lobe; tenth abdominal segment (Fig. 11) is flat, ventrally covering the greater part of the ninth segment. In front of the transverse and small anal opening is a large anal lobe, on the inside supported by an oval chitinous frame and on the outside bipartite by a longitudinal median furrow extending forward from the anal opening. The intestine behind the malpighian tubes consists of an anterior wide and curled portion (γ1, Fig. 11) followed by a narrow, more straight posterior portion (γ2, Fig. 11) which opens in the anus. An epipleural area is found in all the segments except the tenth; in prothorax it is represented merely by a small triangular pre-epipleural and post-epipleural division, but in mesothorax and metathorax the median epipleural division is not entirely replaced by or fused with the tergal alar area and on the first eight abdominal segments all three epipleural divisions are well developed. The hypopleural and sternal areas are simple and no intersegmental connecting areas or "cunei" are visible.

The larva is whitish with only a few structures darkly chitinized, particularly the mandibles, the epistomal and the hypostomal margins and the tips of the claws. On each side of prothorax the alar area is marked with a somewhat P-like, slightly chitinized impression.

Well developed setae are present on the headcapsule and mouthparts; long, soft and pale whitish hairs are arranged in a transverse series on each of the two tergal pleads of the segments but are particularly densely set on the ventral areas of thorax, the tibiae of the legs, the epipleural and hypopleural lobes of the abdomen and the ninth abdominal segment.

Hook-shaped and backward directed asperities are present in a single transverse series of eight on each side of the prescutum of metathorax and the prescuta of the first six abdominal segments, and also in a single transverse series of four on each side of the prescutum of the seventh abdominal segment; none on the eighth and none on the prescutal region of the ninth, but a single series of about five hooks is found on each of the epipleural lobes of the latter segment, all pointing toward the forward facing anal segment; the two anal cushions are entirely naked.

The spiracles (Fig. 7) are small, lateral, all of the same size and present in mesothorax and the first eight abdominal segments; the pre-epipleural area in which the mesothoracic spiracle is seated is separated from the anterior margin of prothorax by a distance somewhat longer than the entire length of one of the legs.

Anatomical details.

Head capsule (Fig. 3) generally lightly chitinized, with epicranial median suture and the frontal sutures effaced; epistoma (Fig. 2) between the dorsal

articulations of the mandibles, well chitinized, band shaped, with the sagittal length about one-fifth of its entire width; cranial setae, the epistomal excluded, about a score in number, different in size; the epistomal setae (epi Fig. 2) numerous and varying in size.

Ocellus obliterated with no trace left.

Antenna (Figs. 1 and 2) attached to a large dome-shaped basal membrane (abm) extending from a circular hole in the chitin at the end of epistoma. The antenna itself reduced to a fleshy knob (j) with a large, elongate, conical tactile appendix (ta) that has substituted the lacking apical joint.[1]

Clypeus (Fig 2) transverse, about four times as wide as long; no setae.

Labium (Fig. 2) transverse, anterior margin slightly convex, corners rounded, medianly about as long as clypeus and approximately as wide as long; setae long; arranged in a transverse series with six present on each side. Posterior labial horns (h) and hind margin of labrum between the horns covered above by clypeus and below by epipharynx; horns comparatively short, slightly S-shaped, strongly converging, forming an imaginary angle of about 120°; hind margin with posterior convexity.

Epipharynx (Fig. 1) on each side with (1) four stout, short, spindle-shaped setae arranged in an oblique inwardly and posteriorly directed series extending from the anterior margin to about the middle of epipharynx, (2) a group of about six moderately long setae occupying the antero-lateral corner of epipharynx, (3) a group of about ten, mostly long and thin setae in the interspace between the two converging series of short, stout setae.

Mandible (Figs. 5 and 6) strong with broad basis and heavy articulations, viewed from the top trilateral with excavated inner side; dorsal edge of inner side (Fig. 6) carrying one tooth closely behind the apex and a tuft of hairs near the basis of the mandible, ventral edge of inner side (Fig. 5) carrying a large round process closely behind apex. No molar part. About six setae placed dorso-externally.

Maxilla (Figs. 4 and 8) with well-developed cardo and stipes; cardo naked, stipes carrying half a dozen setae. Maxillary mala (ma) large, on dorsal side toward the buccal cavity entire, on ventral side divided by a styliform chitinous prolongation from stipes (sty Fig. 4) into two lobules of different size, inner lobule (i) being only about one-third as large as outer lobule (o); dorsally (Fig 8), along the anterior and the free lateral edges, mala armed with a single

[1]In Kemner's paper in Swedish, quoted in the bibliography, is found on pp. 8–10 a very instructive discussion with four figures illustrating the gradual reduction of the apical antennal joint in the larvae of the Anobiidae. He shows that in *Ptilinus* and *Dendrobium pertinax* a well-developed apical joint is present besides a large tactile appendix on top of a large basal joint; the apical joint is still seen in *Xestobium* but much reduced, and a large tactile appendix occupies the usual place of the apical joint; in *Anobium striatum* the apical joint is represented merely by a ring-shaped spot with one well-developed club-shaped and two minute setae, and the large tactile appendix has the character of an apical joint as in *Xestobium*. In *Nevermannia* every trace of an apical joint has disappeared and not even a well-developed club-shaped seta is found.

series of about half a dozen strong, spindle-shaped, spine-like setae; ventrally (Fig. 4) along the entire free edge, inner lobule armed with a single series of half a score of short, rather thin, stiff setae, all alike, and ventrally (Fig. 4), irregularly distributed over most of the surface, outer lobule armed with about a dozen, mostly long and thin setae. Maxillary palpus three-jointed, gradually tapering forward, projecting in front of mala by about half the length of the apical joint; basal joint (1 Fig. 4) cylindrical, about as wide as long, carrying three small setae; second joint (2 Fig. 4) same form as the basal joint but only about two-thirds as large, with two small setae; apical joint (3 Fig. 4) long and slender, about twice as long and half as wide as basal joint, minute tactile papillae on the tip, no setae.

Subfacial area (sm and mt Fig. 4) large, slightly divided into a posterior submentum (sm) and anterior mentum (mt), no distinct maxillary articulating area and no gula; mentum armed anteriorly on each side with four small setae, submentum naked.

Labium (Fig. 4) rather large. Eulabium (eu) posteriorly rounded, limited by a narrow postlabial chitinization (ch) of a shape intermediate between capital letters U and V; half a dozen setae irregularly placed anteriorly on each side. Labial palpus two-jointed, about as long and of the same general shape as the two terminal joints of the maxillary palpus; apical joint with one large (ap) and many minute tactile papillae on the tip. Ligula (li) well developed, subconical, with about four setae on each side.

Hypopharynx (Fig. 8) fleshy, minutely papillose, consisting of (1) a posterior and central portion, the hypopharynx proper (hyp), without any setae and (2) an anterior portion, glossa (gl), with a minute setula on each side.

Leg (Fig. 6) four-jointed, trochanter lacking or fused with femur. Coxa (co) large, bulgy, soft skinned, having an obliquely placed, narrow chitinous frame facing toward femur and dorsally articulating with a process from a small hypopleural chitinization (hc). Femur (fe) retractile into the framed part of coxa, as long as the frame and armed with about five long setae. Tibia (ti) as long as femur and half as thick, beset with numerous long setae. Claw (ta) long, strong, pointed, slightly S-carved, heavily chitinized at the end and carrying a single seta.

Spiracle (Fig. 10) with a smooth open ring-shaped mouthpiece (o) which has a minute thickening (s) located where an open spout-like prolongation occurs in the larvae of other Anobiid genera. Closing apparatus (cla) short-armed and separated from the mouthpiece by an atrium (atr) shaped like a dilated portion of a trachea and provided with many spinulose taenidia (t).

COMMENTS ON THE CLASSIFICATION OF THE ANOBIIDAE.

The difficulties often met with in the attempts of determining the nearest relatives of a new larval type and of placing it accordingly are well illustrated by the experiences encountered in the efforts to decide on the taxonomic position of the present larva of the new genus *Nevermannia*.

The classification of the larvae of the Anobiidae has not been dealt with in modern taxonomic literature in a comprehensive

way, except to some extent in the very important contributions of the Swedish entomologist, N. A. Kemner (1915 and 1916), and the Finnish entomologist, Unio Saalas (1923). But these papers deal only with the larvae of Swedish and Finnish species representing comparatively few genera, namely, *Ernobius*, *Anobium*, *Dendrobium*, *Xestobium*, *Dorcatoma* and *Ptilinus*, and even if it is true that both authors with keen foresight have emphasized characters which have proven to be of fundamental importance for the separating of other Anobiid genera and even of a tribe (*Ptilinini*), yet the aim of their descriptions and keys is primarily the specific determination of their larvae. Consequently most of the characters considered seem to be of subordinate value for the general separation of the Anobiid genera and especially for their arrangement into larger groups of tribal rank.

As far as non-described but well determined larval material concerns available for comparison, the National Museum possesses a useful collection of larvae representing most of the European and American genera. But much preliminary work had to be done, such as the preparation of slides exhibiting various kinds of anatomical details and the making of notes and drawings recording these, before the relationship between the genera represented could be considered.

This, however, has been accomplished and as a result the following brief characterizations have been written of what are considered as the main divisions or "tribes," and a key has been constructed for the determination of the genera examined. In the key the supposed relationship between the genera is expressed by the sequence in which they are given.

A perusal of these tribal characterizations and the generic key will show that the larva of the genus *Nevermannia* distinctly belongs in the tribe here named as Anobiini, and in this tribe probably will have to be placed nearest to the genus *Sitodrepa*. It differs, however, from the latter genus in several characters, one of which is the presence in *Nevermannia*, but not in *Sitodrepa*, of a round tubercle ventrally at the basis of the apical tooth of the mandible. The development of this tubercle is unusual among the Anobiini, but occurs also in the three genera *Trypopitys*, *Priobium* and *Coelostethus*.

In the complex of families connected with the *Anobiidae*, namely, the *Ptinidae*, *Bostrichidae*, *Psoidae* and *Lyctidae* the *Anobiidae* and the *Ptinidae* are most closely related. Jointly they are characterized by having the head subglobular and protracted from the thorax, the mouthparts directed downward, no more than one ocellus developed on each side, antenna very short, one- or two-jointed with a large tactile appendix from the basal joint, the mandible simple and apically pointed, never provided with a dorsal pseudo-molar process and a fleshy pros-

theca as found in the *Psoidae* or with a rounded, gouge-like apex; the abdominal segments are not divided dorsally into three large transverse folds as in the *Bostrichidae;* a small indistinct median tergal fold may sometimes be seen but usually there are only two transverse folds; the last abdominal spiracle is not larger and longer than the rest, as is the case in the *Lyctidae*, but all abdominal spiracles are of the same size and often provided with a remarkable, open, spout-like prolongation from the peritrema. The main character by which the *Anobiidae* and *Ptinidae* are separated, is found in the position of the thoracic spiracle which in the Anobiidae is located a considerable distance from the anterior margin of prothorax, but in the *Ptinidae* on the anterior margin.

The larvae representing the genera of the *Anobiidae* belong to several distinctly different types, some of which are more deviating from the great bulk of the Anobiid genera than the *Ptinidae*. Probably a separation of the *Anobiidae* into at least three new families would be logical or, mutatis mutandis, the *Ptinidae* should be incorporated as a mere tribe in a family *Anobiidae*, sensu lato. The main divisions, here regarded and named as tribes, into which the Anobiidae genera have been arranged according to their larvae, are: *Hedobiini*, *Ptilineurini*, *Xestobiini*, *Lasiodermini*, *Anobiini*, *Vrilettini*, *Xyletinini*, *Coenocarini* and *Ptilinini*. These tribes can briefly be characterized as follows:

Tribes.

(1) *Hedobiini:* Epipharynx densely covered with long hairs and lacking any median or paramedian chitinous marks. Maxillary mala simple. (Including the genus *Hedobia.*)

(2) *Ptilineurini:* Epipharynx as in the Hedobiini. Maxillary mala bilobed, inner lobule much smaller than outer lobule. Underside of tibia of anterior legs densely beset with short stout spines. Spiracles large, ring-shaped and without spout-like prolongations. (Including the genus *Ptilineurus.*)

(3) *Xestobiini:* Epipharynx with two posteriorly converging short series of about five strong spine-like setae; no median or paramedian chitinous marks. Maxillary mala bilobed, inner lobule much smaller than outer lobule and carrying only a single, strong terminal spine. (Including the genera *Xestobium* and *Ozognathus.*)

(4) *Lasiodermini:* Epipharynx as in Xestobiini. Maxillary mala bilobed; inner lobule much smaller than outer lobule and carrying more than one seta. Claws short and strongly curved, empodium present. (Including the genera *Lasioderma* and *Petalium.*)

(5) *Anobiini:* Epipharynx as in Xestobiini and Lasiodermini. Maxillary mala as in Lasiodermini. No empodium. (Including the genera *Catorama*, *Protheca*(?), *Anobium*, *Hadrobregmus*, *Microbregma*(?), *Trypopitys*, *Coelostethus*, *Dendrobium*, *Priobium*, *Sitodrepa* and *Nevermannia.*)

(6) *Vrilettini:* Epipharynx with a pair of elongate groups of about twenty

or more hairs or short spines and near the anterior margin with a pair of paramedian chitinous marks. Maxillary mala bilobed, inner lobule much smaller than outer lobule. (Including the genus *Vriletta*.)

(7) *Xyletinini:* Epipharynx as in Vrilettini. Maxillary mala bilobed; inner lobule as large or larger than outer lobule. (Including the genera *Ernobius*, *Xyletinus*, *Oligomerus*, *Nicobium* and *Trichodesma*.)

(8) *Caenocarini:* Epipharynx with a pair of elongate groups of more than twenty short spines and antero-medianly with a single, spinose mark. Maxillary inner lobule at least as large as outer lobule. Mandible with a low and long molar part. (Including the genera *Eutylistes*, *Dorcatoma* and *Caenocara*.)

(9) *Ptilinini:* Epipharynx with a pair of short series of about four long setae and postero-medianly with a single large, round, chitinous mark. Maxillary mala simple. Labium posteriorly limited by a post-labial chitinization as long as wide, posteriorly pointed and reversely arrow-shaped. (Including the genus *Ptilinus*.)

The genera distributed in the tribes above are determined by the following key:

Genera.

1. Labium posteriorly more or less rounded; post labial chitinization narrow and U-shaped or lacking ..... 2.
   Labium posteriorly pointed; postlabial chitinization reversely arrow-shaped, as long as wide ..... 23.
2. Maxillary mala simple; epipharynx densely covered with long hairs and lacking a single median or a pair of paramedian chitinous marks ..... *Hedobia*.
   Maxillary mala divided into two lobules; armature of epipharynx diverse ..... 3.
3. Underside of tibia of first leg densely beset with short spines; epipharynx as in *Hedobia* ..... *Ptilineurus*.
   Underside of tibia of first leg not densely spinose; epipharynx not as in *Hedobia* ..... 4.
4. Epipharynx with a pair of posteriorly converging series of about five stout, short, often hooked setae, antero-medianly with or without a tuft of hairs but always without chitinous marks. Maxillary inner lobule always smaller than outer lobule ..... 5.
   Epipharynx with a pair of elongate groups of about twenty or more hairs or short spines, anteriorly with a single median or a pair of paramedian chitinous marks. Maxillary inner lobule usually of the same size as outer lobule ..... 15.
5. Inner lobule of maxillary mala carrying a single spine-like seta ..... 6.
   Inner lobule carrying more than a single seta ..... 7.
6. Anterior tergal fold of most of the abdominal segments armed with numerous, short, hook-shaped asperities ..... *Xestobium*.
   Anterior tergal fold of abdominal segments carrying long, soft hair, but no asperities ..... *Ozognathus*.
7. Empodium present; claw short and strongly curved. Anterior tergal fold of abdominal segments with many long hairs and without or with a few additional granuliform asperities; inner margin of mandible compressed and semicircular ..... *Lasioderma* and *Petalium*.

Empodium absent. Claw often long and straight; anterior tergal fold of most abdominal segments with numerous dark granuliform asperities and without or with a few additional hairs ..... 8.

8. Tergal asperities arranged in transverse patches with about three to five or more asperities in the sagittal middle line of most of the abdominal segments ..... 9.

Tergal asperities in a distinctly single or in one to two irregular transverse series ..... 14.

9. Spiracles large, the thoracic being two to three times as long as the claw, or of moderate size but then with a lateral open spout-like prolongation as long as or longer than the spiracle. Claw short, about as long as width of tibia ..... 10.

Spiracles of moderate size, about as long as claw or shorter, spout-like prolongation only indicated or entirely lacking ..... 11.

10. Spiracles large, without distinct spout; mandible with one (*Catorama*) or two (*Protheca*) lateral teeth on dorsal edge of inner face; tergal asperities strong and hook-shaped ..... *Catorama*
and probably *Protheca* (of which only a cast skin is available).

Spiracles of moderate size but with long spout; mandible with three lateral teeth on dorsal edge of inner face ..... *Anobium*.

11. Prothorax large, on each side bearing a rod-like slightly curved chitinized impression; tergal asperities arranged in several series; mandible with three (*Hadrobregmus*) or two (*Microbregma*) lateral teeth but without a round projection at basis of apical tooth ..... *Hadrobregmus*
and possibly *Microbregma* (of which only a cast skin is available).

Prothorax without chitinous rod-like impression; mandible with a round projection ventrally at basis of the apical tooth; two to three lateral teeth ..... 12.

12. Tergal asperities arranged in about four irregular transverse series on the first five abdominal segments ..... *Trypopitys*.

Tergal asperities in transverse patches with three asperities along the sagittal middle line on the first six abdominal segments ..... 13.

13. Tergal patches broad band-like, with asperities in about three transverse series laterally. Tibia about three to four times as long as claw .....
Coelostethus (= *Dendrobium*).

Tergal patches rapidly attenuating, with asperities in one or two transverse series laterally. Tibia about twice as long as claw ..... *Priobium*.

14. Mandible with two lateral teeth on dorsal inner edge, apical tooth without tubercle ventrally at basis; epipharynx with three serial setae on each side; maxillary inner lobule with three long, thick apical spines; first eight abdominal segments with one to two transverse series of dorsal asperities ..... *Sitodrepa*.

Mandible with one lateral tooth on dorsal inner edge, apical tooth with a large round tubercle ventrally at basis; epipharynx with four serial setae on each side; maxillary inner lobule with a single series of about ten setae along the entire inner margin; first seven abdominal segments with a distinctly single transverse series of dorsal asperities .... *Nevermannia*.

15. Maxillary inner lobule smaller than outer lobule. Epipharynx near an-

terior margin with a pair of paramedian chitinous marks; mandible laterally on inner side straight and shaped like the edge of an ax; tergal asperities arranged in about three irregular transverse rows..... *Vriletta.*

Maxillary inner lobe as large or larger than outer lobe.....16.

16. Epipharynx anteriorly with a pair of paramedian chitinous marks; spiracles with a short spout; mandible without molar part.....17.

Epipharynx anteriorly with a single median, spinose mark; spiracles varying in type; mandible with a low, long molar part.....21.

17. Labrum about twice as broad as long; with posterior horns styliform and slender and hind margin straight; mandible with one tooth on ventral inner edge immediately behind apical tooth..... *Ernobius.*

Labrum about as wide as long, with posterior horns irregularly shaped, often shoe-like.....18.

18. Hind margin of labrum straight; tergal asperities in about two transverse rows.....19.

Hind margin of labrum curved, inverted U-shaped; tergal asperities in about four transverse series.....20.

19. Posterior horns of labrum rather long, curved and not shoe-shaped..... *Xyletinus.*

Posterior horns of labrum short, distinctly shoe-shaped..... *Oligomerus.*

20. Posterior tergal fold beset with long, soft hairs..... *Nicobium.*

Posterior tergal fold densely beset with short, spine-like, thin hairs..... *Trichodesma.*

21. Spiracles provided with a large, oval cribriform plate. Legs of normal length..... *Eutylistes.*

Spiracles without cribriform plate.....22.

22. Legs of normal length..... *Dorcatoma.*

Legs short and conical, not more than twice as long as wide. Mandible with a setose, transverse ridge above ventral condyle, inner edge finely serrate..... *Caenocara.*

23. Epipharynx with a large postero-median chitinous mark; labrum with comparatively few but long, strong setae; mandible with inner edge convex and strongly projecting; maxillary mala simple without inner lobule. Spiracles very large, annular, without spout..... *Ptilinus.*

The larvae on which the above given tribal characterizations and generic key are based are present in the U. S. National Museum, and the material is partly preserved in alcohol, partly placed on permanent slides. The species examined are the following: *Hedobia imperialis* Linnaeus; *Ptilineurus marmoratus* Reitter; *Xestobium rufo-villosum* Degeer; *Ozognathus cornutus* (Le Conte); *Lasioderma serricorne* (Fabricius); *Petalium seriatum* Fall; *Catorama punctatum* (LeConte), *C. nigritulum* (LeConte); *C. grande* Fall, *C. tabaci* Guérin, *C. herbarium* Gorham (St. Salvador), *C. grave* (LeConte); *Protheca hispida* LeConte; *Anobium striatum* Olivier; *Hadrobregmus carinatus* (Say), *H.*

umbrosus Fall; *Microbregma emarginatum* (Duftschmid); *Trypopitys sericeus* (Say); *Priobium eichhoffi* Seidlitz; *Coelostethus notatus* (Say); *Dendrobium pertinax* Linnaeus; *Sitodrepa panicea* (Linnaeus); *Nevermannia dorcatomoides* Fisher; *Vriletta expansa* LeConte; *Ernobius punctulatus* (LeConte), *E. pallitarsis* Fall, *E. granulatus* LeConte, *E. abietinus* Gyllenhal, *E. mollis* Linnaeus; *Xyletinus fucatus* LeConte; *Oligomerus sericans* (Melsheimer); *Nicobium castaneum* Olivier; *Trichodesma klagesi* Fall; *Eutylistus facilis* Fall; *Dorcatoma dresdensis* Herbst, *D. setulosum* LeConte; *Caenocara oculata* (Say); *Ptilinus ruficornis* Say, *P. basalis* LeConte, *P. pectinicornis* Linnaeus, *P. fuscus* Geoffroy.

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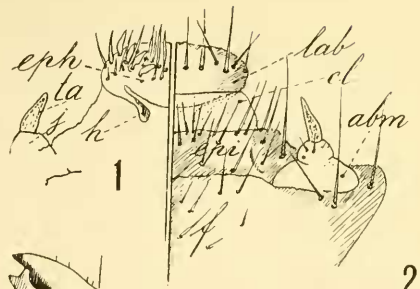
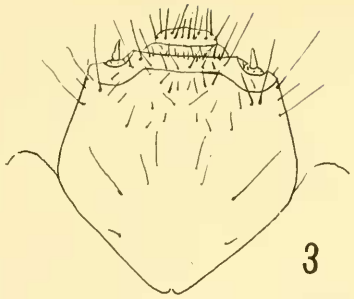
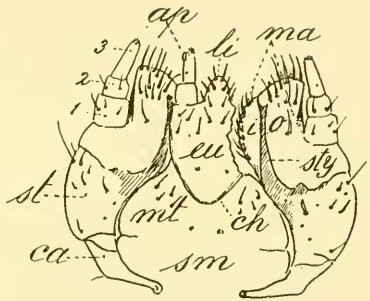
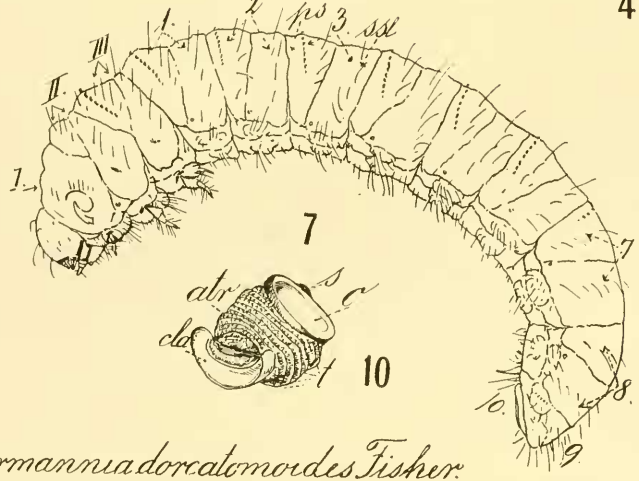
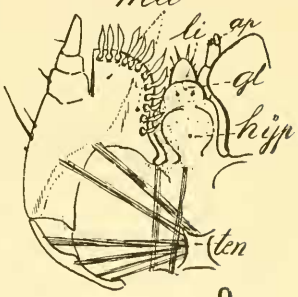
[1]The paper by J. W. Munro was unknown to me until my article was in proof.—A. G. B:

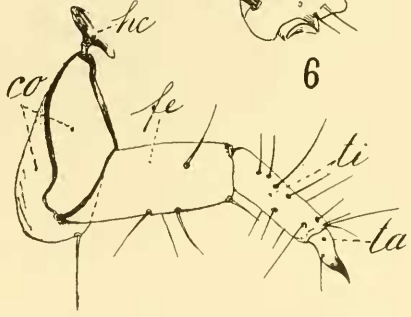












Nevermannia dorcatomoides Fisher.

Adeline Boving del.

stalt. Hafte 21. Nr. 8. (Biology of six Swedish species of genus *Ernobius*; list of literature.)

EXPLANATION OF PLATE.

(Drawings by the author.)

1. Epipharynx and antenna: eph, epipharynx; h, epipharyngeal horn; j, the only antennal joint; ta, tactile appendix.
2. Labrum, clypeus, epistoma and antenna: abm, basal membrane of antenna; cl, clypeus; epi, epistoma; f, frons; lab, labrum.
3. Head capsule: dorsal view.
4. Ventral mouthparts, ventral view: ap, apical papilla of labial palpus; ca, cardo; ch, postlabial chitinization; eu, eulabium; i, inner lobule of maxillary mala, li, ligula; ma, maxillary mala; mt, mentum; o, outer lobule of maxillary mala; sm, submentum; st, stipes maxillaris; sty, stylus maxillaris; 1, 2, 3, the three joints of maxillary palpus.
5. Left mandible, ventral view.
6. Right mandible, dorsal view.
7. Larva, habitus from the side: ps, pre-scutum; ssl, scuto-scutellum; I–III, thoracic segments; 1–10, abdominal segments.
8. Ventral mouthparts, buccal view: ap, apical papilla of labial palpus; gl, glossa; hyp, hypopharynx; li, ligula; ma, mala; ten, tentorum.
9. Mesothoracic left leg: co, coxa; fe, femur; hc, hypopleural chitinization; ta, claw; ti, tibia.
10. Abdominal spiracle: atr, atrium; cla, closing apparatus with two short arms; o, mouthpiece of spiracle; s, thickening of frame; t, taenidium.
11. Tenth abdominal segment: a, anal opening; af, median fold extending forward from anal opening; al, lobe in front of anus; r^1, anterior wide portion of rectum; r^2, posterior narrow portion of rectum ending with anus; T, tenth abdominal segment.

Jan. 3, 1927. A. G. B.

AN ANIMAL CENSUS OF TWO PASTURES AND A MEADOW IN NORTHERN NEW YORK.[1]

By George N. Wolcott.

A census of the insects and other small invertebrates from one hundred square feet of grassland on Merrimac fine sandy loam, near Barneveld, New York, was made between April and October, 1919, by collecting all those found in one square foot each day. A strong pail, thirteen and one-quarter inches in diameter (which covers an area of one square foot), with handle attached to the bottom and a hole with screw cover in the center of the bottom, but with a sharp cutting edge around the top, was the only special apparatus used. Armed with this pail, a large knife, forceps, hand-lens, ether, cyanide jar and newspapers, one was ready to begin operations. The pail was

[1](Summary of a thesis presented in partial fulfillment of the requirements for a doctorate degree granted in June, 1925, by Cornell University.)